ROADS Advisory Panel
12th March 2024, 15-17 UTC, 16-18 CET, 11am-1pm EDT (USA daylight savings time)
Teleconference
Mini- Workshop #3: Global Scale Systems

1. Welcome and Review of Agenda

Today's ROADS Advisory Panel (AP) meeting was the third in a series of informative mini-workshops on how observing and data system requirements and implementation strategies are structured, documented and evaluated across diverse activities. The focus at today's workshop was on global systems.

The ROADS Advisory Panel (AP) Co-chairs, Sandy Starkweather and Lauren Divine welcomed participants and given the number of invited guests to the meeting; a quick round of introductions took place (List of participants Appendix 1). Lauren provided an overview of today's agenda (Appendix 2) noting that meeting documents are available at the following workspace:
https://drive.google.com/drive/folders/1rm3aGZcGuKaVMagkNNpU8sOEzEChKWns
She also noted that minutes from the last AP meeting were available for review at
https://drive.google.com/drive/folders/1rm3aGZcGuKaVMagkNNpU8sOEzEChKWns

Margaret Rudolf set the stage for today's presentations and discussion by reviewing the ROADS Guiding Principles, including that the ROADS process should complement and integrate the current planning approaches used by existing networks (regional to global), activities and projects. She then presented the four phases in the ROADS Expert Panel process, noting that Phase 3: Develop SAV Observing and Data Systems Requirements is the topic for today's meeting. This material is all available on the ROADS website https://roadsadvisorypanel.org/documentation She noted that previous workshops had focused on regional systems, and Indigenous and community-scale systems.

2. Presentations on Regional Systems

a. **Global Climate Observing System (GCOS)** Thomas Lavergne spoke on this agenda item, noting his involvement in Arctic PASSION and particularly sea ice variables and the use of satellite data. He noted the importance of having realistic requirements for observations and that these requirements should also be targets so that the observation systems can evolve towards these targets over time. Thomas works with the sea ice requirements of GCOS. Together with other sea ice experts, they provided input back to GCOS: i) noting sea ice variables that were missing and should be considered as new Essential Variables (EVs); and, ii) noting that some EVs were too broad and not sufficiently funded (e.g. lack of research and development costs to look at data, not deploying new observation systems) so that it was problematic to get traction in the observing variables. Therefore, they entered into a

dialogue with GCOS that resulted in the creation of more detailed EVs under one broad EV umbrella of sea ice. He noted the importance of structuring and organizing observation variables (e.g. SAVs or EVs) under a broader umbrella variable.

Under his work with Arctic PASSION, Thomas wrote a short paper with Stefan Kern for the AOS 2022 (Short statement) that reinforces the idea of grouping variables under one umbrella.

Thomas cited an example of the possible wording of an EV, as "needing sea ice thickness information at a spatial resolution of better than 10 kms, and an accuracy of better than 0.1 metre". This sentence would be clear to authorities as to what is required.

It was noted that some variables (e.g. Sea Ice) are shared between GCOS and Global Ocean Observing System (GOOS) and clarification was asked on the links between these two global systems. Rodica Nitu explained that all Essential Ocean Variables (GOOS) and Essential Climate Variables (GCOS) are coordinated through a joint Ocean Observing Panel for Climate with input from GCOS, GOOS and WCRP.

Further linkages were noted with ESA's Climate Change Initiative (CCI) and developing variables for sea ice monitoring. Thomas noted that he is the science lead on the CCI sea ice ECV project. He explained that collaboration has worked really well. However, only two variables (sea ice concentration and sea ice thickness) are currently covered with the budget; five other identified variables could still be explored.

The need for integration between satellite observations and its spatial resolution, and on-the-ground observations was discussed. Thomas explained that at the global satellite level of observations, the question of confidence in observations is addressed by ground-truthing measurements. The validation of satellite observations means a coming-together of satellite and ground observations. He emphasized the need to have one common variable that is observed from these two perspectives. When asked if there is a prioritized list of ground observations under any variables, Thomas noted that these do not exist yet.

Hank Loescher asked about the process and if the observing requirements are presented in some type of structure. Thomas noted that the GCOS Implementation Plan does provide tables with requirements, emphasizing that "openness and traceability" of the data is very important in the long term.

Thomas stated that climate model reanalysis is increasingly important in climate modelling. This means that the types and requirements of essential variables are changing with the increased need for numerical weather predictions and climate operational services.

b. **World Meteorological Organization (WMO)** Rodica Nitu presented slides on efforts across the WMO, including WMO's Rolling Review of Requirements (RRR), Observing Systems Capability Analysis and Review (OSCAR), GCOS, and Global Cryosphere Watch (GCW). She noted that the RRR provides a systematic process to support the high-level design of observing requirements of the WMO. The structure of the RRR has six Earth System Application Categories with 26 Application Areas that include 342 variables and over 800 requirements.

Rodica stated that a gap analysis is regularly conducted of the requirements vs existing capabilities the Application Areas to seek the "most impactful variables". This review provides guidance to the WMO member countries on the observations that are most critical. She presented a table of the OSCAR requirements on sea-ice cover that included a definition of the variable,

measuring units, etc. that are included in the database. Rodica also reinforced the importance of consistent terminology (variable names, definitions) amongst observing communities.

c. **European Space Agency (CSA) -** Ola Grabak presented slides on ESA's requirements and observations. He noted that ESA has two broad perspectives – satellite development as well as user-driven requirements of space observations. The development of satellites is conducted with discussions with earth system scientists to address emerging science requirements. Efforts have addressed meteorological missions and Copernicus – the EU observation programme for users across the EU. Additional details on the ESA Climate Change Initiative (CCI) were provided noting its support to GCOS efforts. There are 55 Essential Climate Variables, and 27 of these variables can be ESA generated.

d. **Global Earth Observations (GEO) -** It was noted that SAON is involved with GEO through the Arctic GEOSS efforts. Helen Glaves presented slides on documenting requirements of observations and also showcased– G-reqs – a tool used to support in-situ data requirements gathering process for GEO. The GEO Data Working Group is tasked with addressing data policy, ethics, and governance issues to improve earth observations for decision making. There are three sub-groups within the Data WG, including one on In-Situ Data that works to characterize the in-situ data landscape (e.g. common barriers to data sharing, conducting gap analyses, engaging with existing networks) and to develop strategic objectives to advance in-situ data within GEO. Helen spoke about the new database tool called G-reqs that aims to determine if current in-situ datasets meet user requirements, if there are barriers to access and use, and if new data should be collected. She highlighted a number of drivers for user-requirements for in-situ data. G-reqs system asks for meta-data about the in-situ data including aspects of: topic (EVs), geographic area, quality (uncertainty and spatial resolution), time (update frequency, historical data), barriers (privacy, data access), and additional specifics of the data. The G-regs tool is available at www.g-reg.grumets.cat and she encouraged the AP to review the tool. Helen stated that the tool is open for other applications.

In response to comments from Mikko, Helen responded that the focus within GEO has been on in-situ data, but that there are wider discussions ongoing in terms of how to bring the different requirements of in-situ-based and satellite-based observations together. She noted that they are not independent of one another, but that the requirements for in-situ data are directly driven by requirements for earth observation as well. In fact, there may be an artificial separation of one set of requirements from another set of requirements.

Alice Bradley spoke of the continual need to link observations back to the reason "why"? The documentation of user needs and requirements must be done correctly to ensure that observations are linked and supportive of societal benefits. Sandy characterized this as "traceability" and agreed that it must be highlighted. Jan added that the need to characterize requirements within SAON should perhaps be one of the SAON priority initiatives and that maybe an existing system could be adopted and modified. Helen said that

the G-regs tool could be customized if the tool is deemed to be useful for SAON application.

Rodica reinforced the importance of identifying the application and requirements to be supported and of understanding the current baseline of existing observations. This will identify the gap that needs to be addressed. It can be a step-by-step approach to achieve goals.

Alona Alexia asked whether ESA collaborates with Indigenous communities on the use of satellite data to monitor their lands and protect them (wildfire, ice, floods etc.) through space technology or maybe through space education programs? Thomas responded that this is not done on a continuous basis but that it is done on a project-by-project basis.

Alice spoke of financial commitments noting that there is a big difference between SAON efforts and those of international organizations, like WMO or GOOS, that have greater capacity and national support by member states. Close collaboration with national and global scale organizations will be key. She also agreed with the value to piggy-back SAON efforts with global efforts but that consideration must be given to ensure that Indigenous organizations also see the efforts as useful and navigable, and that they present viable solutions for everyone. This may require outreach and testing before plans can be made and systems adopted.

In conclusion, Sandy noted the all three mini-workshops have been very informative and that much has been learned on how the various observing systems fit within the context of their specific requirements (local to regional to global). She noted that additional consideration will be needed regarding the SAON principle of “complementarity and integration” and how SAON can align its requirements with ongoing efforts of others without reinventing work. The experiences gained from the initiatives presented at today’s meeting will be beneficial in moving forward and informing the SAON ROADS processes.

3. **Upcoming Events -** Margaret summarized upcoming events at the ASSW and AOS, highlighting the Open Partnership Meeting. There will be several SAON ROADS related meetings taking place that will be valuable for ROADS AP members to attend (see Appendix 2, upcoming meetings).

4. **Other Business –** Jan noted that the Arctic Council is resuming its work with virtual meetings. This includes most of SAON work. The SAON Board will hold a virtual meeting March 24th. Activities will start gradually and ramp up over the coming months.

   Jan reminded AP members to provide their evaluation comments on the Permafrost Phase I documentation by March 15th.

5. **Closing Remarks** – Sandy thanked the guest speakers and expressed appreciation for their input as SAON ROADS moves forward.

The next regular meeting of the ROADS AP will be 16th April, 16-17:30 CET / 10-11:30 am EST / 14-15:30 UTC.

Appendix 1

Participants ROADS Advisory Panel Meeting

12th March 2024
Teleconference – Mini-Workshop on Global Scale Systems

Advisory Panel Member Participants

Alona Alexia, University of the North
Alice Bradley, Williams College, AOS WG #4
Lauren Divine, Aleut International Association (AIA) – ROADS AP Co-Chair
Ola Grabak, European Space Agency, Earth Observation Directorate
Tero Mustonen, SnowChange
Gier Otterson, Institute of Marine Research, Norway
Margaret Rudolf, RNA CoObs (& Food Security Expert Panel)
Sandy Starkweather, NOAA, USA – ROADS AP Co-Chair
Mikko Strahlendorff, FMI, Finland
Tetsuo Sueyoshi, JAMSTEC/NIPR, Japan

Invited Guests
Hajo Eicken, National Arctic Research Center, University of Alaska Fairbanks
Helen Glaves, British Geological Survey
Thomas Lavergne, Arctic PASSION
Hank Loescher, CoObs
Rodica Nitu, WMO
Janet Pawluk

Member Regrets Absent

Christine Barnard, ArcticNet
João Canário, University of Lisbon, Portugal & IASC
Cathy Coon, CBMP/CAFF
Hanna K Lappalainen, PEXX
Heikki Lihavainen, Arctic PASSION & SIOS, Co-Chair of SAON CON
Sten Lund, Government of Greenland
Ilkka Matero, SIOS (Permafrost Expert Panel)
Victoria Qutuuq Buschman, ICC
Volker Rachold, AWI Germany
Andrea Spolaor, CNR, Italy
Chantelle Verhey, World Data Systems (WDO), International Technology Office (ITO) & Co-chair Elect of SAON Arctic Data Committee
Katriina Veijola, FMI, Wildfires EP (Wildfire Expert Panel)
Talia Wells, Arctic Institute of North America, (Sea Ice Expert Panel)

Advisory Panel Ex-Officio members
SAON Secretariat – Jan Rene Larsen, Helen Joseph
SAON – IASC Fellow – vacant

Appendix 2 - Agenda

ROADS Advisory Panel

Teleconference
12th March 2024, 15-17 UTC, 16-18 CET, 11am-1pm EDT (USA daylight savings time)
Join Zoom Meeting
https://cuboulder.zoom.us/j/4105560408

Workspace for agendas and meeting notes:
https://drive.google.com/drive/folders/1rm3aGZcGuKaVMagkNNpU8sOEzEChKWns

This is the third in a series of informative mini-workshops on how observing and data system requirements and implementation strategies are structured across diverse activities, documented and evaluated.
This will Inform SAON's Arctic ROADS process, mainly Phase III and IV documentation.

- 16th January, 2024 – Indigenous-led and community-scale systems
- 13th February, 2024 – Regional systems
- **12th March, 2024 – Global systems**

Workshop #3: Global systems

2. Welcome & Introductions (Lauren, 10 min)
3. Set the Stage (Margaret, 10 min)
4. Presentations from Efforts (Jan, 50 min total):
    a. GCOS (Thomas Lavergne - Arctic PASSION, sea ice. Confirmed (16-1630). Short statement by Thomas Lavergne and Stefan Kern for AOS 2022).
    b. WMO (Rodica Nitu, RRR OSCAR, GCOS, GCW. Confirmed)
    c. ESA (Ola Grabak Confirmed)
    d. GEO (Helen Glaves, Organising requirements, Confirmed (16-17))

    Framing questions to each:
    - Please describe what requirements mean for your network/organisation (developing definition) - and how they help you to achieve your goals
    - Please describe your program or activity and how it relates to observing and/or data system requirements or provides utility to implementing observing and/or data systems
    - How are structures (requirements or implementation strategies) developed or decided upon?
    - Do you use any existing vocabularies or ontologies to structure your information?
    - Are your capabilities open to other collaborators?

4. Dialog questions for the AP and others, *tour de table* style (Sandy, 40 min)
    1. What did we hear about today that would be helpful tools in the Expert Panels' toolkit for Phase III and Phase IV?
    2. What did we hear that informs our thinking about structuring and documenting requirements and implementation for Shared Arctic Variables?

3. What did we hear that informs our thinking about evaluating documentation for Shared Arctic Variables?
4. Do you have one clarifying question for one of the speakers?

Summary & Next Steps (Margaret, 10 min)

1. What further actions should we take to learn more about this topic?
2. How can we look to the AOS for input and progress?
3. Remind people of future workshops & AOS WG efforts of relevance

Upcoming meetings:

- ASSW
    - SAON's Arctic ROADS Booth throughout ASSW
    - Open Partners ROADS meeting - Sat. March 23rd 13:30-15:30 & 16:00-17:00 (UK) in Pollock (St. Leonards)/hybrid
    - Workshop on US AON's Benefit Tool - Sun. March 24th 9:00-10:00 & 10:30-12:30 in Salisbury (JMCC)/Hybrid
    - Indigenous Participation in ROADS - Sun. March 24th 10:30-12:30 in Holyrood (JMCC)./Hybrid
    - Arena for the gap analysis of the existing Arctic Science Co-Operations (AASCO) - Sun 24th 11:00-12:30 in South Hall/Hybrid
    - ICARP IV Research Priority Team Workshop - Topic Area 2: Observing, Reconstructing, and Predicting Future Climate Dynamics and Ecosystem Responses - Monday all day in Pentland East (JMCC)/Hybrid
- AOS
    - In this context note in particular the workshop theme: *Shared Arctic Variables (SAVs): Integration into existing data systems*. 29th March. Meeting room Salisbury, 9:00am -10:30am (UK time).

AOB:

- Resuming Arctic Council work
- Deadline for completing the review of Phase I documentation for permafrost. by Friday.

The next regular workshop will be 16th April, 16-17:30 CET / 10-11:30 am EST / 14-15:30 UTC.

Note to AP Members: Please reserve the third Tuesday every month 16-1730 CET / 10-1130 am EST / 14-1530 UTC. Agenda and other meeting documents will be made available here: https://roadsadvisorypanel.org/meeting-documents